Claims

1. An apparatus for forming or working optical elements and/or optical forming elements, comprising a working apparatus for forming surfaces of form parts by machining or abrasive technique, while at least one measuring device is provided for measuring, when said surface is being worked, changes in form and/or surface roughness of said surface and on the basis thereof controlling said working apparatus.

2. An apparatus according to claim 1, wherein the measuring device is designed for measuring said changes in form with the aid of light beams, in particular interference measurement, and/or or roughness in particular through scatterometry.

3. An apparatus according to claim 1 or 2, wherein said working apparatus is provided with at least one jet nozzle from which, under pressure, a blasting agent can be dispensed for removing surface material through abrasive action, such that as a result thereof desired change in form and/or surface roughness change is obtained.

4. An apparatus according to claim 3, wherein said working apparatus is designed for blasting, under a pressure of between 4 and 100 bar, in particular between 4 and 25 bar, more in particular between 4 and 15 bar and preferably between 5 and 10 bar, a blasting agent against a surface to be worked, in particular a mixture or suspension of a liquid such as water and an abrasive agent such as sand or glass or such solid substance.

5. An apparatus according to any one of the preceding claims, wherein at least one holder is provided for holding the element to be worked in the apparatus, which holder is at least partly translucent while at least one light source and at least one light receiver are disposed adjacent said holder, such that during use, light from said light source can be sent through said holder and an element located thereon and at least light from the light source

reflected by the surface to be worked can be captured by said light receiver, while measuring means are provided for determining absolute and/or relative changes in the surface of said element to be worked from said reflected light captured in said light receiver.

6. An apparatus according to claim 5, wherein the holder is provided with a surface for attachment of said element with the aid of a blocking compound which is translucent, such that the surface facing away from the holder can be worked with the working apparatus while, from the opposite side, light can be sent through the holder, through the element to be worked.

7. An apparatus according to claim 5 or 6, wherein in the holder at least one optical element such as a lens is included, in particular a Fresnel lens, while one or more light sources and light receivers are arranged below the holder for reflecting light through the holder against the surface of the element to be worked, while the holder has dimensions such that it is substantially covered by the element.

8. An apparatus according to any one of the preceding claims, wherein the apparatus comprises at least milling means, grinding means and/or polishing means, while at least the grinding means and/or the polishing means comprise fluid jet polishing means.

9. An apparatus according to any one of the preceding claims, wherein further, an apparatus is provided for grinding the respective element, designed as a lens, into a frame, while abrasive working means are provided, in particular fluid jet polishing means for locally working at least one part of at least one surface of the respective element, the arrangement being such that the respective element is substantially negative, while the respective part is substantially positive, at least with respect to the further element.

10. An apparatus according to any one of the preceding claims, wherein the apparatus is provided with means for insulating the measuring device against vibrations in relation to the working device such that, when the optical

element is being worked, the measuring results of the measuring device are not affected by vibrations caused by the working apparatus.

11. An apparatus according to claim 10, wherein the means for insulating against vibrations comprise active and/or passive damping means.

12. An apparatus according to claim 10 or 11, wherein the working apparatus comprises a first arm, arranged so as to be insulated against vibrations relative to a holder for the element to be worked and the measuring device.

13. An apparatus according to claim 12, wherein the measuring device is provided, at least partly, on a second arm.

14. An apparatus according to any one of the preceding claims, wherein the working apparatus is provided with at least one series of blowing openings through which, during use, a fluid with a grinding agent can be blown out under pressure, for abrasively working a surface, wherein preferably of different blowing openings, a flow rate and/or pressure and/or the outflow velocity and/or the outflow profile can be actively controlled, depending on the measuring data registered by the measuring device.

15. A method for forming or working optical elements or optical forming elements, wherein an optical element is placed in or on a holder such that a surface to be worked lies substantially clear from the holder, whereupon, with the aid of a working apparatus designed for carrying out an abrasive method, said surface to be worked is worked such that at least locally, the thickness of the element decreases while simultaneously, the thickness of the element at least at the location of the momentaneously worked surface part is measured and the working apparatus is controlled on the basis of the measured thickness, at least reduction thereof as a result of the abrasive method.

16. A method according to claim 15, wherein as abrasive method fluid jet polishing is used.

17. A method according to claim 15 or 16, wherein as optical element to be worked an optical element is used with a first side having a first, substantially

continuously proceeding spherical, toric or parabolic surface and an opposite, second side having a second, substantially continuously proceeding spherical or parabolic surface, wherein the first and/or the second side is worked with the aid of the working apparatus such that at least on one of the sides, locally, a recess is formed in the respective surface at a distance from the apex of the two sides.

18. A method according to any one of claims 15 – 17, wherein an element is used having, on a first side, a first, curved, in particular substantially doubly curved surface with a first apex and on an opposite side a second curved surface, preferably substantially doubly curved, with a second apex, while on at least one of the sides at a distance from the respective apex an elevation is provided, while, at the opposite side adjacent said elevation with the aid of the working apparatus a recess is provided.

19. A method according to any one of claims 15 – 18, wherein to the surface to be worked a finishing layer has been or is applied, in particular a scratch resistant, reflective or non-reflective layer, while with said abrasive method, said layer is locally entirely or partly removed.

20. A method according to any one of claims 15 – 19, wherein with the aid of said abrasive method, marking points in said optical element are provided and/or already existing marking points are deepened.

21. A method according to any one of claims 15 – 20, wherein as optical element a mold is manufactured for manufacturing lenses or pre-forms for lenses.

22. A method according to any one of claims 15 – 20, wherein as optical element a lens or a pre-form for a lens is manufactured.

23. A method according to claims 21 or 22, wherein said optical element is designed as a contact lens or pre-form therefor, or a mold therefor.

24. An optical element or pre-form for such an element, provided with a first surface and an opposite, second curved surface, wherein on the second surface, locally, an elevation has been provided while in the first surface,

approximately opposite said elevation, a recess and/or protuberance has been provided.

25. An optical element or pre-form according to claim 24, wherein the first and the second surface are of curved design, concave and convex, respectively, and substantially of spherical, toric, parabolic or hyperbolic shape each with an apex, while the elevation and/or the recess and/or the protuberance have been provided at a distance from the apex.

26. A mold for an optical element, in particular for a contact lens, wherein at least one surface is substantially spherically curved and is provided with a circular recess, which recess has been provided with the aid of an abrasive method, in particular with fluid jet polishing.

27. A mold for an optical element, in particular for a contact lens, wherein at least one surface is substantially spherically curved and is provided with a circular recess, which recess has been provided with the aid of an abrasive method, in particular with fluid jet polishing, while at least two surface deformations are provided in which positioning elements can be formed such that during use a lens formed in the mold is secured against rotation on the eye by said positioning elements.